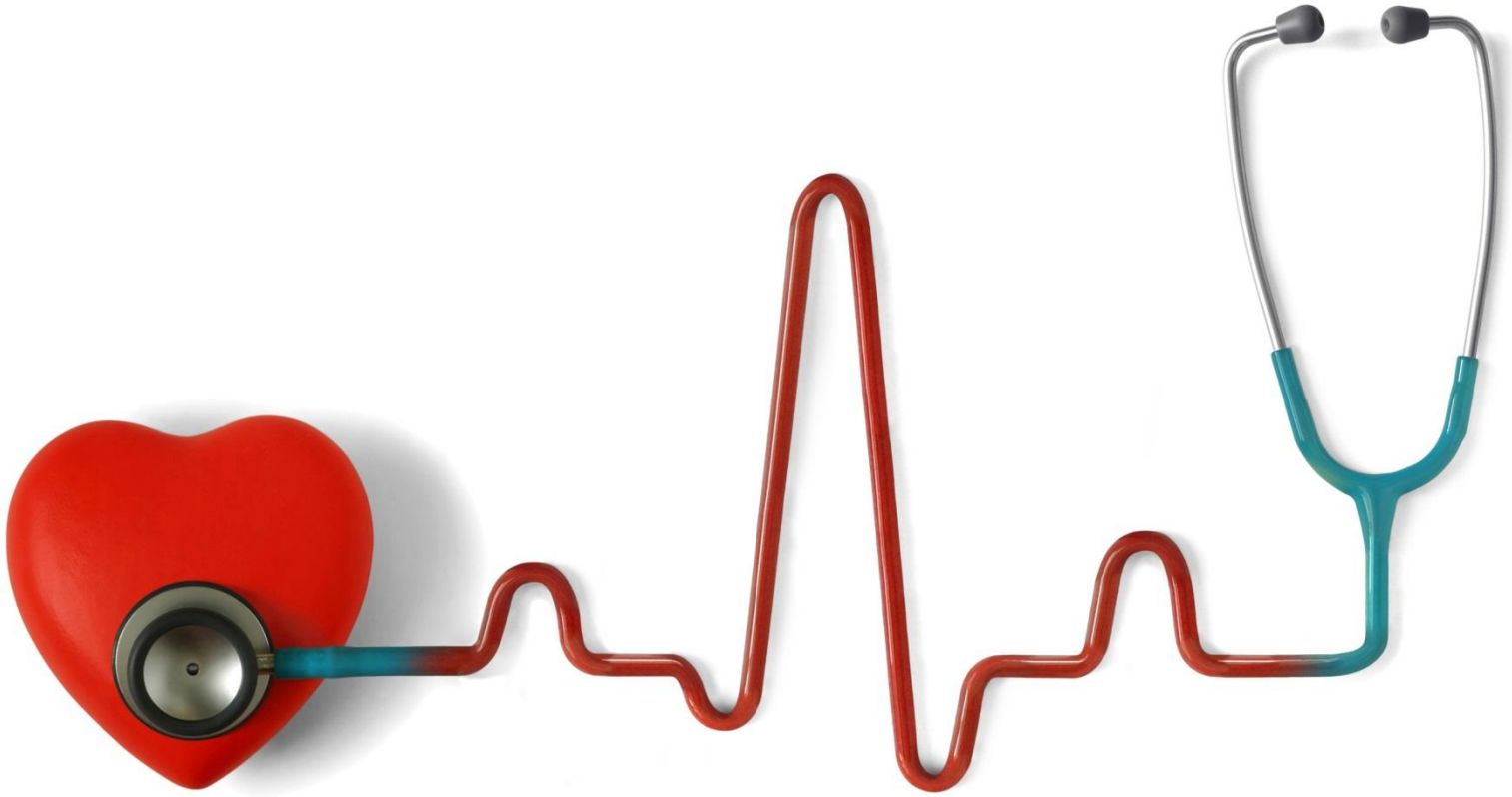
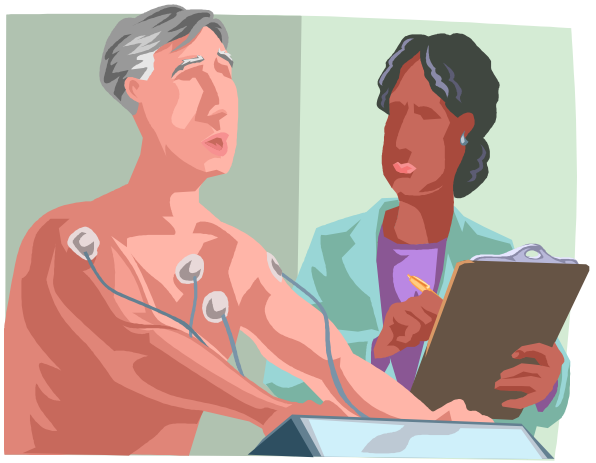
Cardiovascular Fitness



Cardiovascular Disease

- Cardiovascular disease is the leading cause of death in the U.S.— 42% of all deaths
- Approximately 1.5 million heart attacks occur each year—500,000 are fatal
- About 50% of people who have heart attacks wait 2 hours before seeking medical attention and die before reaching the hospital

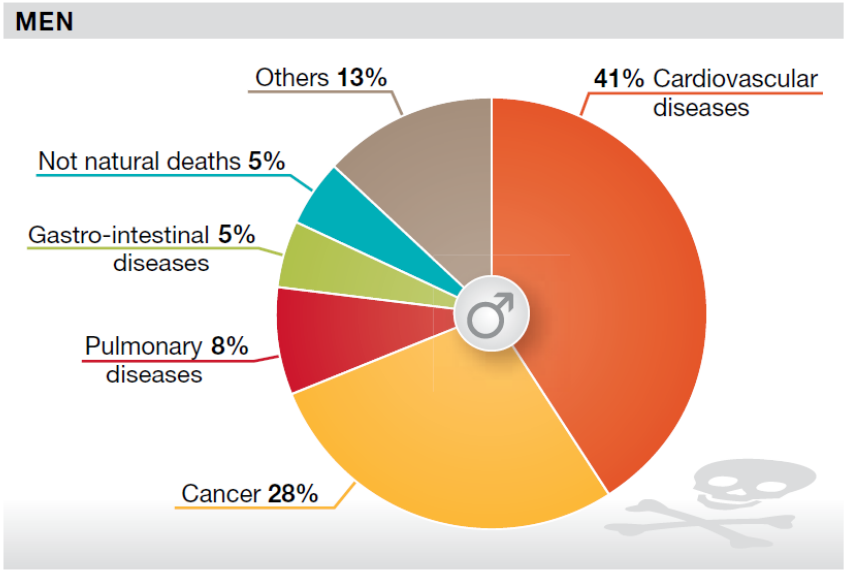


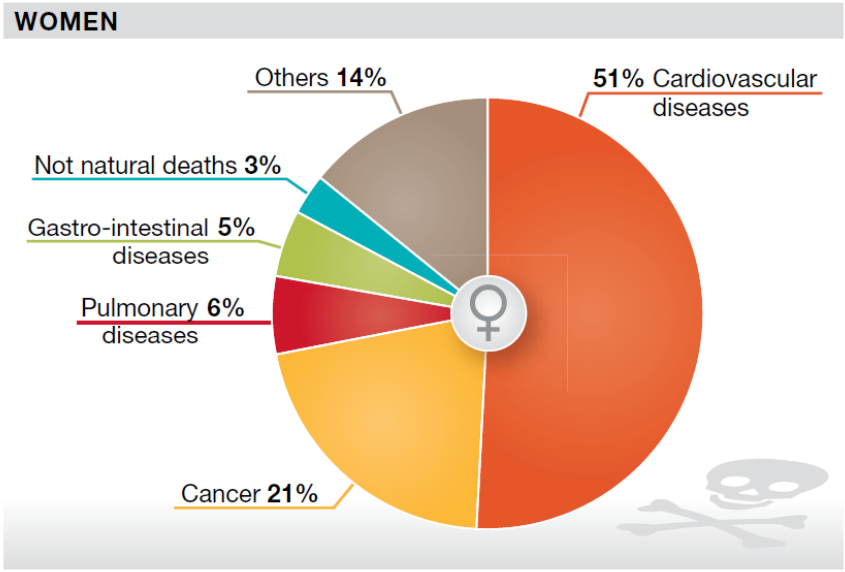
Cardiovascular Disease

- Coronary heart disease (CHD)
  - #1 cause of death
- Stroke
  - #3 cause of death

According to the American Heart Association, approximately 42% of the population will die from a form of cardiovascular disease

Gender Differences in Health





https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3388783/

Modifiable Risk Factors of Heart Disease

The Framingham Heart Study started in 1948. Extensive physical exams and lifestyle interviews were conducted every two years on over 5000 people. It documented the major risk factors associated with heart disease:

- Smoking
- Hypertension
- Hypercholesterolemia
- Physical inactivity
- Overweight / overfat

<u>These major risk factors are preventable!</u>

http://www.framinghamheartstudy.org/researchers/exam-forms.php

Framingham Research Milestones

1960 Cigarette smoking increases the risk of heart disease

1961 Cholesterol level, blood pressure, and ECG abnormalities increases the risk of heart disease

1967 Risk of heart disease decreased by physical activity and increased by obesity

1970 High blood pressure increases the risk of stroke

1976 Menopause increases the risk of heart disease

1978 Psychosocial factors found to affect heart disease

1988 High levels of HDL chloesterol reduces risk of death

2001 High-normal blood pressure is associated with an increased risk of cardiovascular disease

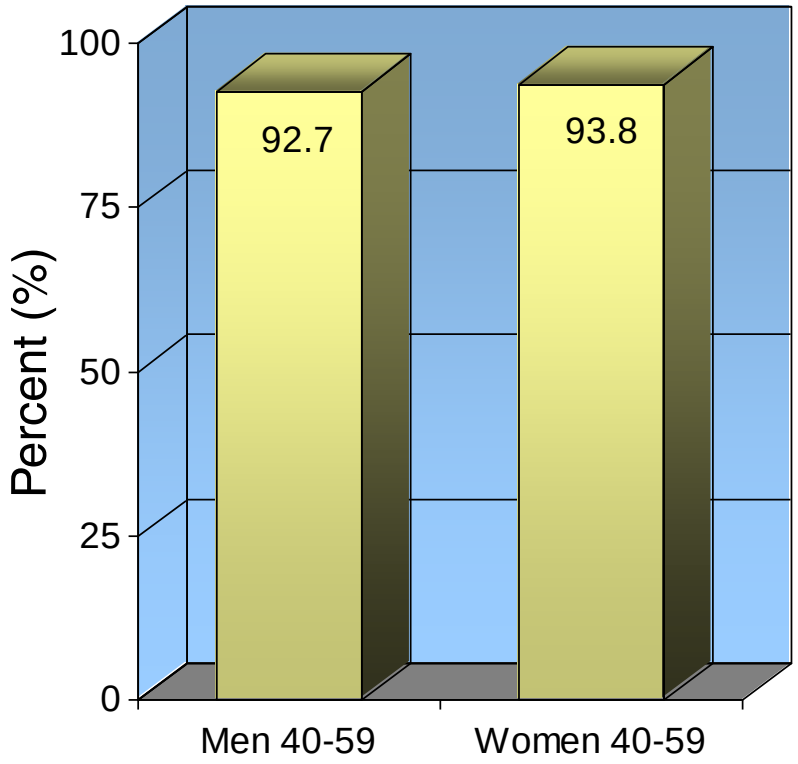
2002 Obesity is a risk factor for heart failure

2008 Social networks exert key influences on decision to quit smoking

https://www.framinghamheartstudy.org/about-fhs/research-milestones.php

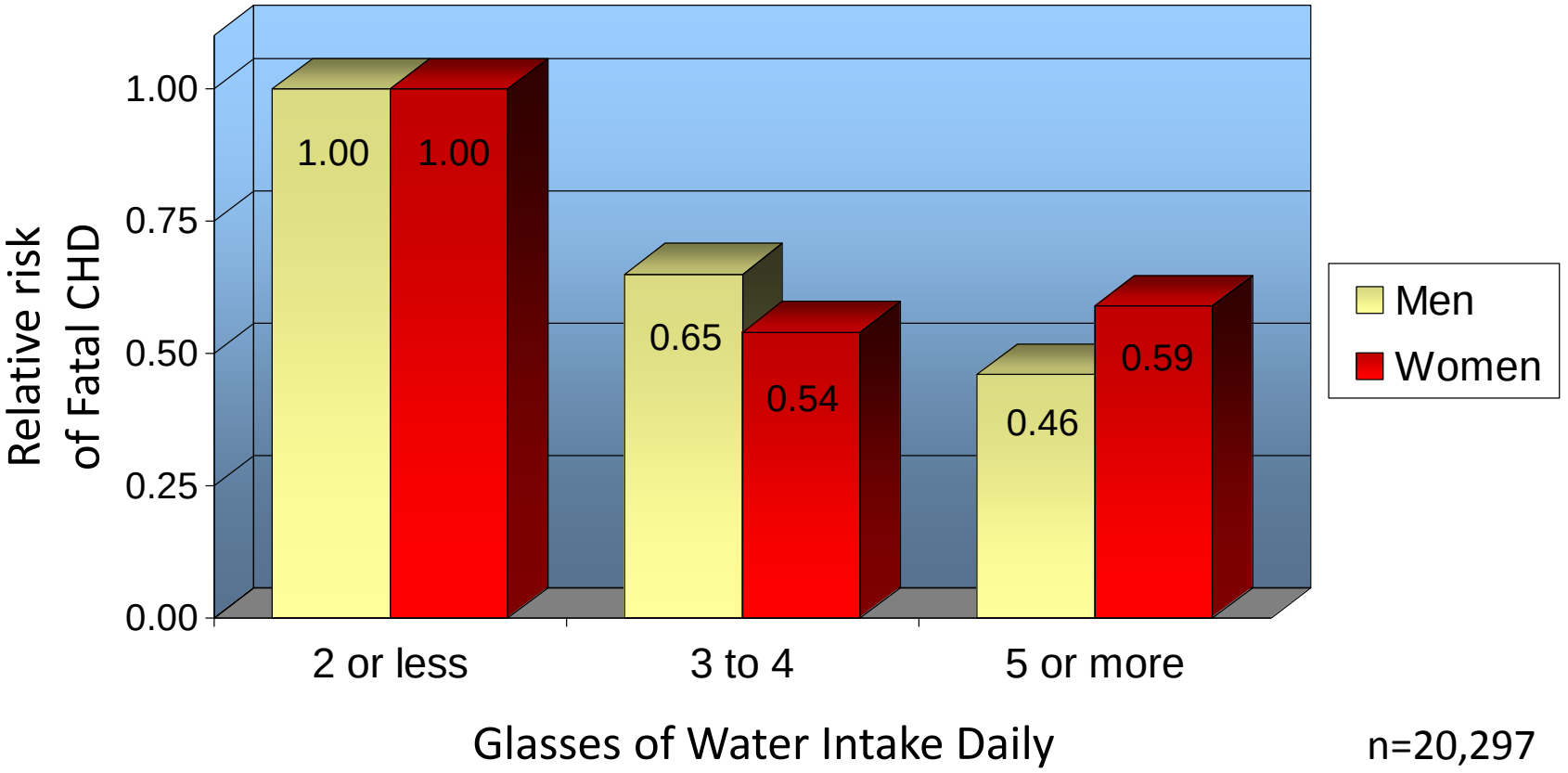
Percent of People with one or more major CHD Risk Factors

- 87–94% of middle aged men and women who died from a heart attack had one or more major risk factors
  - Smoking
  - Cholesterol 240+
  - Blood pressure 140/90+
  - or, Diabetes present



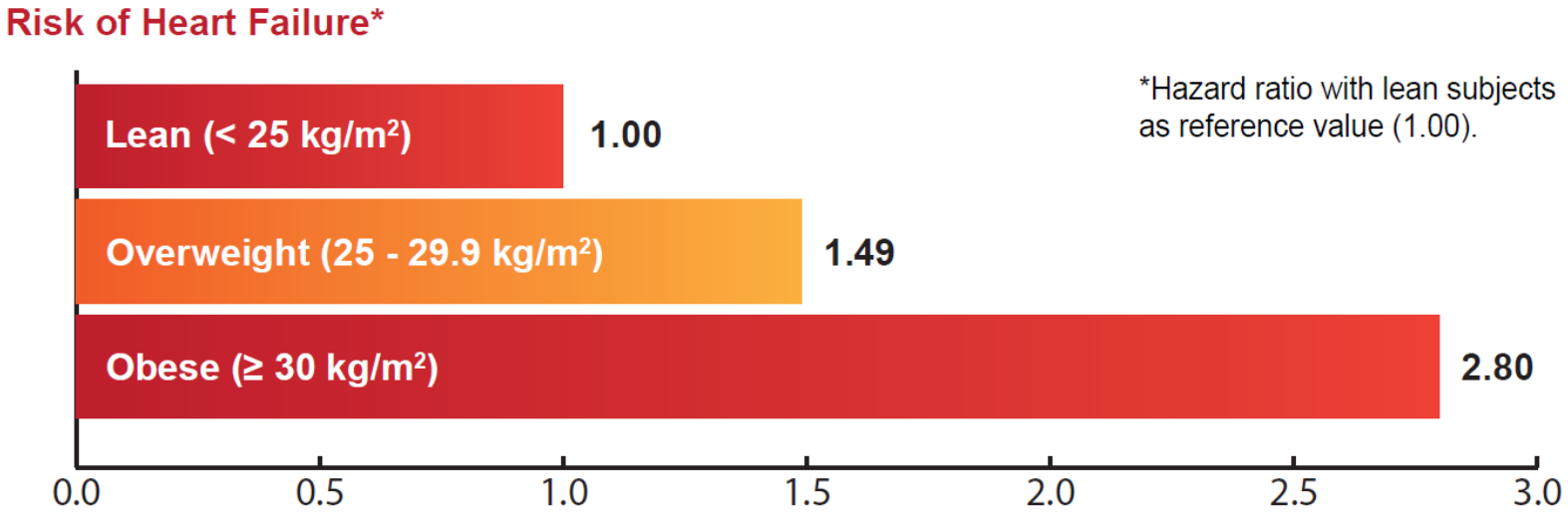
JAMA. 2003 Aug 20;290(7):891-7. http://www.ncbi.nlm.nih.gov/pubmed/12928465

Water Intake and Heart Disease



Water, other fluids, and fatal coronary heart disease: the Adventist Health Study.
Am J Epidemiol. 2002 May 1;155(9):827-33. http://www.ncbi.nlm.nih.gov/pubmed/11978586

High BMI Linked to Heart Failure



In the United States, approximately 37% are overweight (preobese), 25% are obese, 38% do not achieve the recommended amount of physical activity, and 14% are inactive. Public health approaches to curtail excess weight, to maintain optimal weight, and to promote regular physical activity have the potential to limit the scourge of HF.

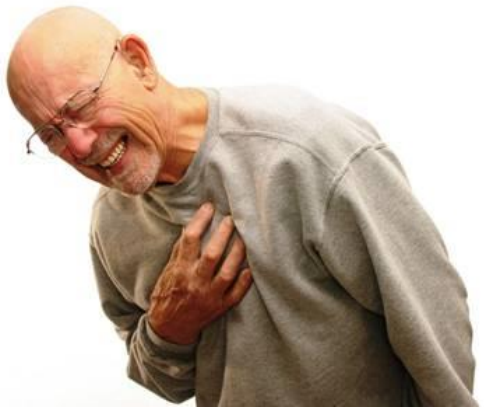
Body mass index and vigorous physical activity and the risk of heart failure among men
Circulation 1-6-09 http://www.ncbi.nlm.nih.gov/pubmed/19103991

Cardiovascular Disease

- Coronary artery disease (CAD) is diagnosed when any artery is narrowed by 60% or more
- A myocardial infarction (heart attack; death of the heart muscle) occurs when blood flow to the heart muscle is disrupted
- Most heart attacks occur after age 65, but the process begins as early as adolescence
- Congestive heart failure occurs when the heart muscle is so damaged that it can no longer contract with sufficient force to pump blood throughout the body

Myocardial Infarction

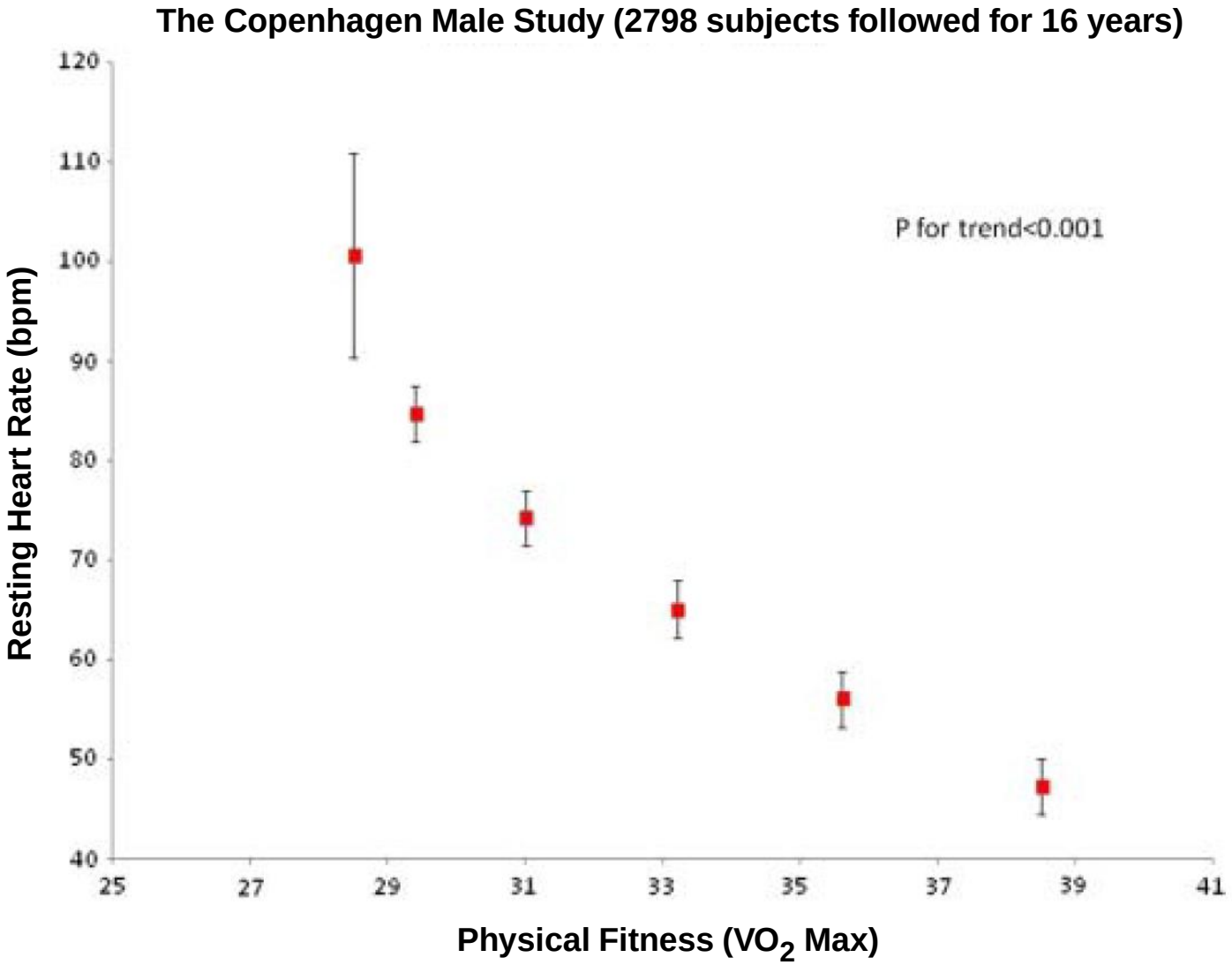
- The medical term for heart attack is myocardial infarction (MI)
- Up to one third of all heart attacks are silent: without obvious signs or symptoms
- Silent ischemia, reduced blood flow, can initiate heart attacks without warning
- Most heart attacks are obvious



Cardiovascular Disease

- Heart disease is an acquired disease that is preventable
- Americans as young as 18 have obstructions in their coronary arteries caused by atherosclerosis
- The Framingham Heart Disease Study showed that a rapid resting heart rate increased the risk of death from heart attack
- Atherosclerosis, characterized by plaque beneath artery linings, is responsible for 80% of CAD deaths in the U.S.

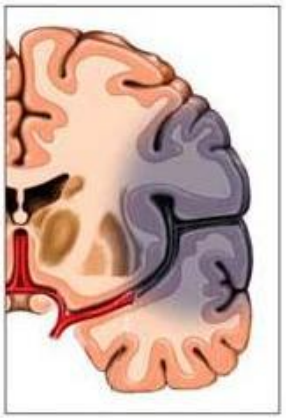
Physical Fitness vs. Resting Heart Rate



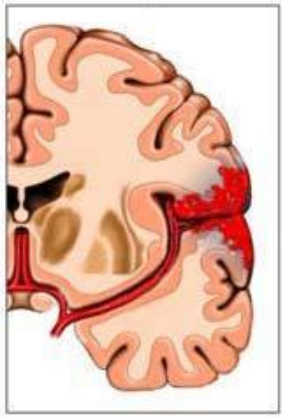
Heart. 2013 Jun;99(12):882-7. http://www.ncbi.nlm.nih.gov/pubmed/23595657

Brain Attack (Stroke)

- Brain attacks are caused by a thrombus or an embolus (70% to 80%) or a cerebral hemorrhage
- Brain cells die, causing loss of function of some parts of the body
- Brain attacks have the same risk factors and prevention factors as heart disease



Ischemic Stroke



Hemorrhagic Stroke

THIS WOMAN IS HAVING A STROKE
ACT FAST CALL 911

- **F**ace: Ask the person to smile and notice if there is drooping of one side of the face.

- **A**rms: Ask the person to raise their arms. Notice if there is weakness of one side of the body, dizziness, or difficulty walking.

- **S**peech: Ask the person to speak and notice if there is slurring of speech or difficulty understanding speech.

- **T**ime: Get immediate help. Remember there is a ‘window of opportunity’ for the use of clot busting drugs.

Unchangeable Risk Factors for Heart Disease (AHA)

- Age: 80% of fatal heart attacks occur after age 65
- Male gender: Heart disease is the leading cause of death for both males and females
  - Females have a lower rate than males
  - Rate is increasing among females, particularly those who smoke and use oral contraceptives
- Heredity and Race: A tendency toward heart disease appears to be hereditary

Changeable Risk Factors – Cholesterol

- A certain amount of cholesterol is necessary for good health
- The body (primarily the liver) produces more cholesterol on its own than it gets from the diet
- Saturated fat increases the liver's production of cholesterol
- <u>The best way to lower serum (blood) cholesterol is to reduce intake of saturated fat</u>

Changeable Risk Factors – Cholesterol

- Cholesterol is a steroid that does not dissolve in blood, so it is transported to cells by protein packages
- Low-density lipoproteins (LDL), the primary transporters of cholesterol, are the most capable of producing atherosclerosis
- People with low blood levels of LDL (less than 100 mg/dl) rarely have heart attacks
- Female hormones (Estrogen) lowers LDL and raises HDL and may increase blood flow to the heart

New Guidelines for Fat and Cholesterol

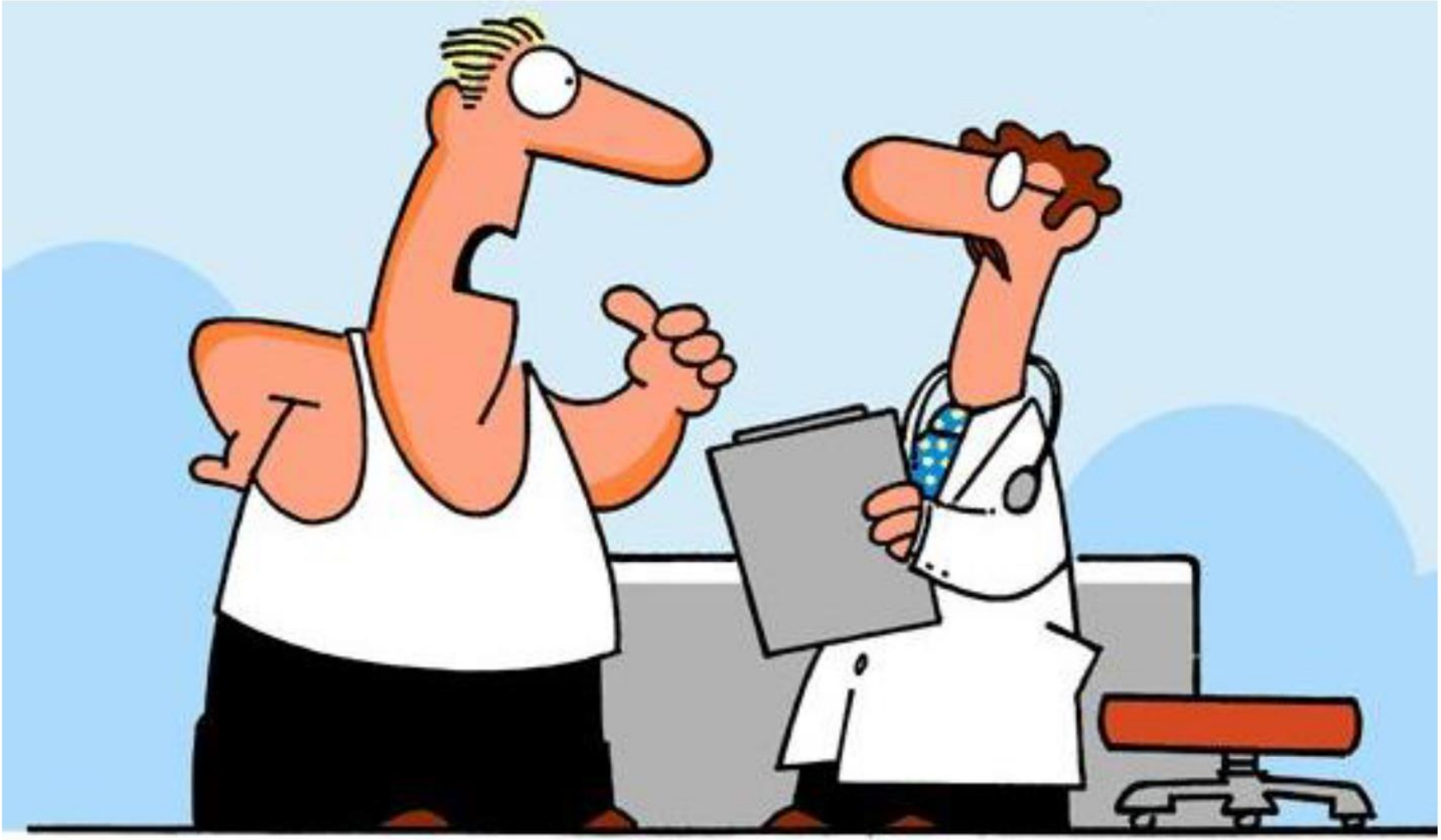
The National Heart, Lung, and Blood Institute suggests:

- Dietary cholesterol < 300 mg/day for healthy individuals; < 200 mg/day for those at **high risk**
- Total fat 25-35% of total daily calories (majority should come from monounsaturated and polyunsaturated fats)
- Saturated fat and transfatty acids should be limited to a maximum of 10% of total calories

Is Dietary Cholesterol Bad for You?

- Many Western countries do not have dietary recommendations for cholesterol intake. Instead, they focus on reducing saturated fat and trans fats, because they are more potent risk factors for CVD.
- Advice to restrict cholesterol may contribute to increased consumption of questionable alternatives, such as simple sugars, highly refined carbohydrates, and saturated and trans fats.
- The current epidemiological evidence indicates that dietary cholesterol (at current intakes) does not increase the risk of heart disease in healthy individuals.

http://www.ncbi.nlm.nih.gov/pubmed/22890825
http://advances.nutrition.org/content/3/5/711.full



“I’ve always been a high achiever, always striving for Bigger, faster, greater … and now suddenly I’m expected To settle for *lower* blood pressure and *less* cholesterol?!”

Metabolic Syndrome

- Excessive abdominal fat
- High blood pressure
- High blood glucose (insulin resistance)
- Elevated triglycerides
- Low HDL cholesterol

This combination of factors produces a multiplier effect that greatly increases your risk of heart disease

Strategies for Lowering Cholesterol

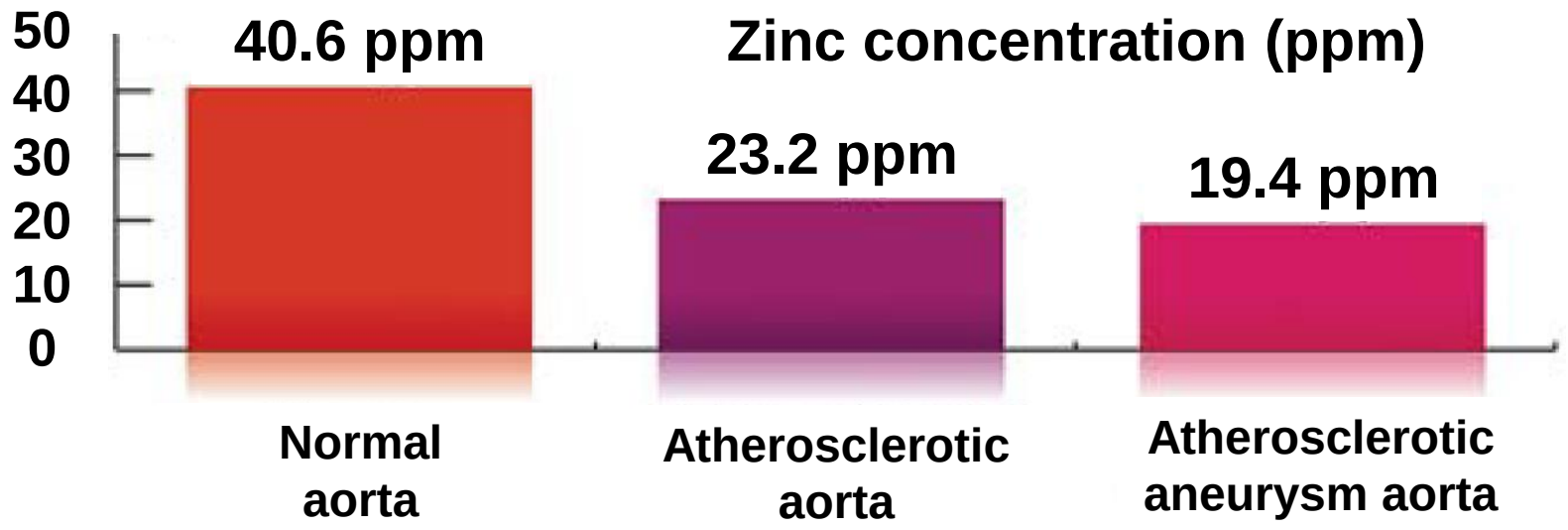
- Reduce fat consumption
- Reduce saturated fat consumption
- Reduce dietary cholesterol
- Lose weight if you are overweight
- Stop smoking
- Increase consumption of soluble fiber
- Do aerobic exercise at least 3–4 times a week for at least 30 minutes each time

Approximate and Cumulative LDL Cholesterol Reduction Achievable by Dietary Modification

Dietary Component	Dietary Change	Approximate LDL Reduction
Major		
Saturated fat	< 7% of calories	8–10%
Dietary cholesterol	< 200 mg/day	3–5%
Weight reduction	Lose 10 lbs	5–8%
Other LDL lowering options		
Viscous fiber	5–10 g/day	3–5%
Plant/sterol esters	2g/day	6–15%
Cumulative estimate		**20–30%**

Source: Adapted from ATP III 2002
www.nhlbi.nih.gov/files/docs/resources/heart/atp-3-cholesterol-full-report.pdf

Zinc & Lipid Peroxidation



Lipid peroxidation and LDL oxidation are believed to be critical for arteriosclerosis, and consequently angina pectoris. Administration of biologically available zinc was a beneficial treatment in a significant percentage of patients with severely symptomatic, inoperable atherosclerotic disease.

High-dose zinc to terminate angina pectoris: a review and hypothesis for action by ICAM inhibition. Med Hypotheses. 2006 http://www.ncbi.nlm.nih.gov/pubmed/16084666

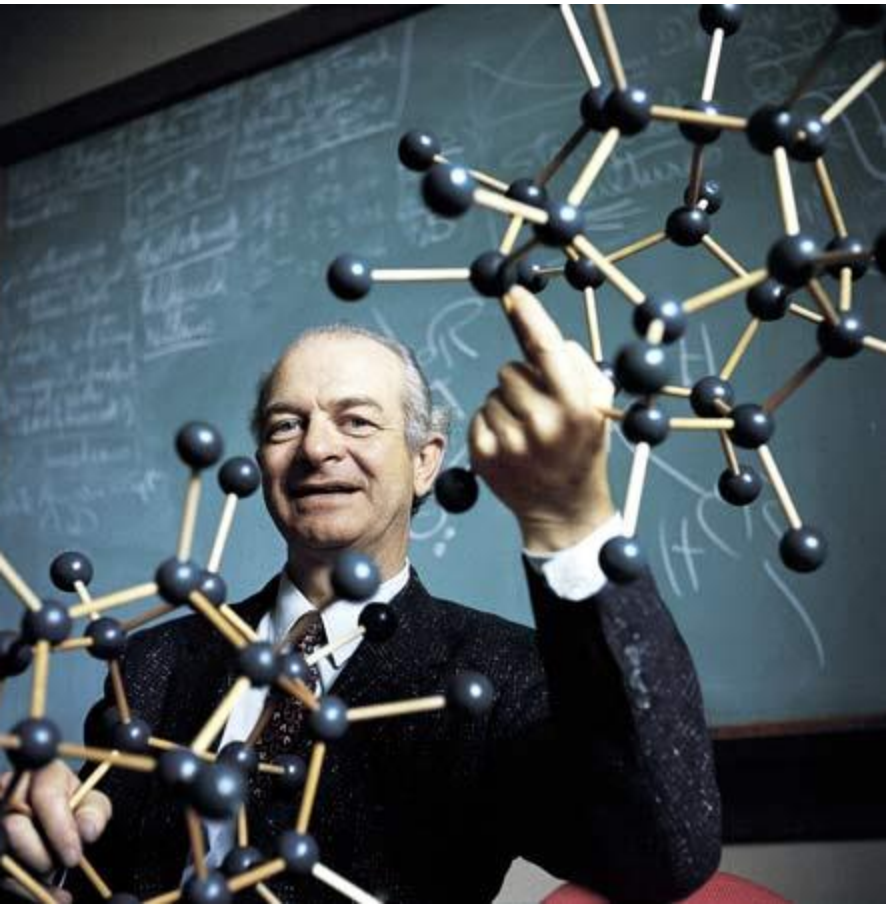
HDL Cholesterol

- High-density lipoproteins (HDL's) protect the arteries from atherosclerosis by removing excess cholesterol from the blood and tissue cells
- Raises HDL: Physical exercise, weight loss, and moderate alcohol consumption
- Lowers HDL: Cigarette smoking, diabetes, elevated triglyceride levels, and anabolic steroids

HBO – The Weight of the Nation

www.youtube.com/watch?v=2BiI0uwqDVg&hd=1

The Lipid Theory vs. the Unified Theory



- About 80% of total cholesterol is self manufactured by the liver
- Why would the liver self manufacture too much cholesterol?
- Cholesterol is a weak antioxidant made by the body to do the best it can with a deficiency of dietary antioxidant nutrients

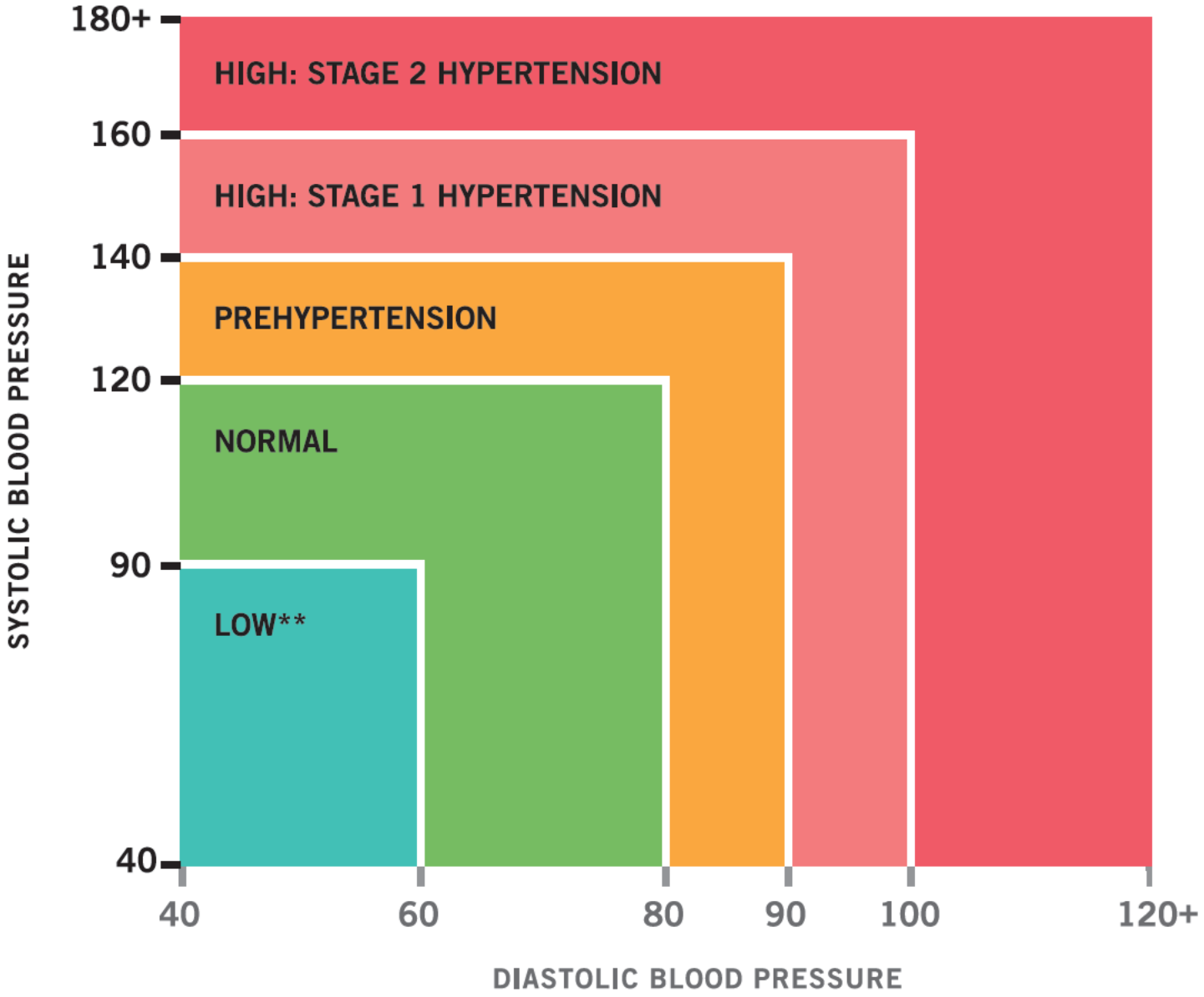
http://www.ourhealthcoop.com/pauling.htm

Lipitor Drug Effects

COUNTERTHINK
THIS DRUG MAY CAUSE DIZZINESS, CHEST PAIN, DIARRHEA, LOSS OF MEMORY, BLOOD CLOTS, JOINT PAIN AND ANAL LEAKAGE.
CONCEPT-MIKE ADAMS
ARE THOSE THE SIDE EFFECTS?
NO. THOSE ARE THE MAIN EFFECTS.
ART-DAN BERGER
© 2007 by Truth Publishing International, Ltd.
THE SIDE EFFECT IS THAT IT MIGHT LOWER YOUR CHOLESTEROL.
WWW.NATURALNEWS.COM

Changeable Risk Factors – Blood Pressure

- Blood pressure is the force exerted against artery walls as blood travels through the circulatory system
- High blood pressure (hypertension) has no signs or symptoms
- An estimated 90% to 95% of hypertension is essential (of unknown origin)
- High BP = 140/90 mmHg



http://www.vertex42.com/ExcelTemplates/blood-pressure-chart.html

Changeable Risk Factors – Blood Pressure

- Long-term uncontrolled hypertension increases the work of the heart, causes it to hypertrophy, and leads to congestive heart failure
- Hypertension damages the arteries, accelerates atherosclerosis, and is the most important risk factor for brain attacks

Changeable Risk Factors – Tobacco

- Cigarette smoking may be the most harmful of the preventable risk factors for chronic illness and premature death
- These illnesses include chronic bronchitis, emphysema, strokes, and 87% of all lung cancers
- Environmental Tobacco Smoke (ETS) causes the deaths of 35,000 to 40,000 nonsmokers annually

Tobacco Mortality

- Cigarette smoking is responsible for one of every five deaths in the US, causing:
  - 90% of lung cancer
  - 80% of emphysema
  - 75% of bronchitis
  - 30% of coronary heart disease

Nicotine

- Nicotine is a powerful stimulant that:
  - Increases LDL and lowers HDL
  - Accelerates clotting of the blood
  - Makes the heart beat faster and causes irregular heart beat
  - Constricts blood vessels
  - Increases oxygen requirement of cardiac muscle

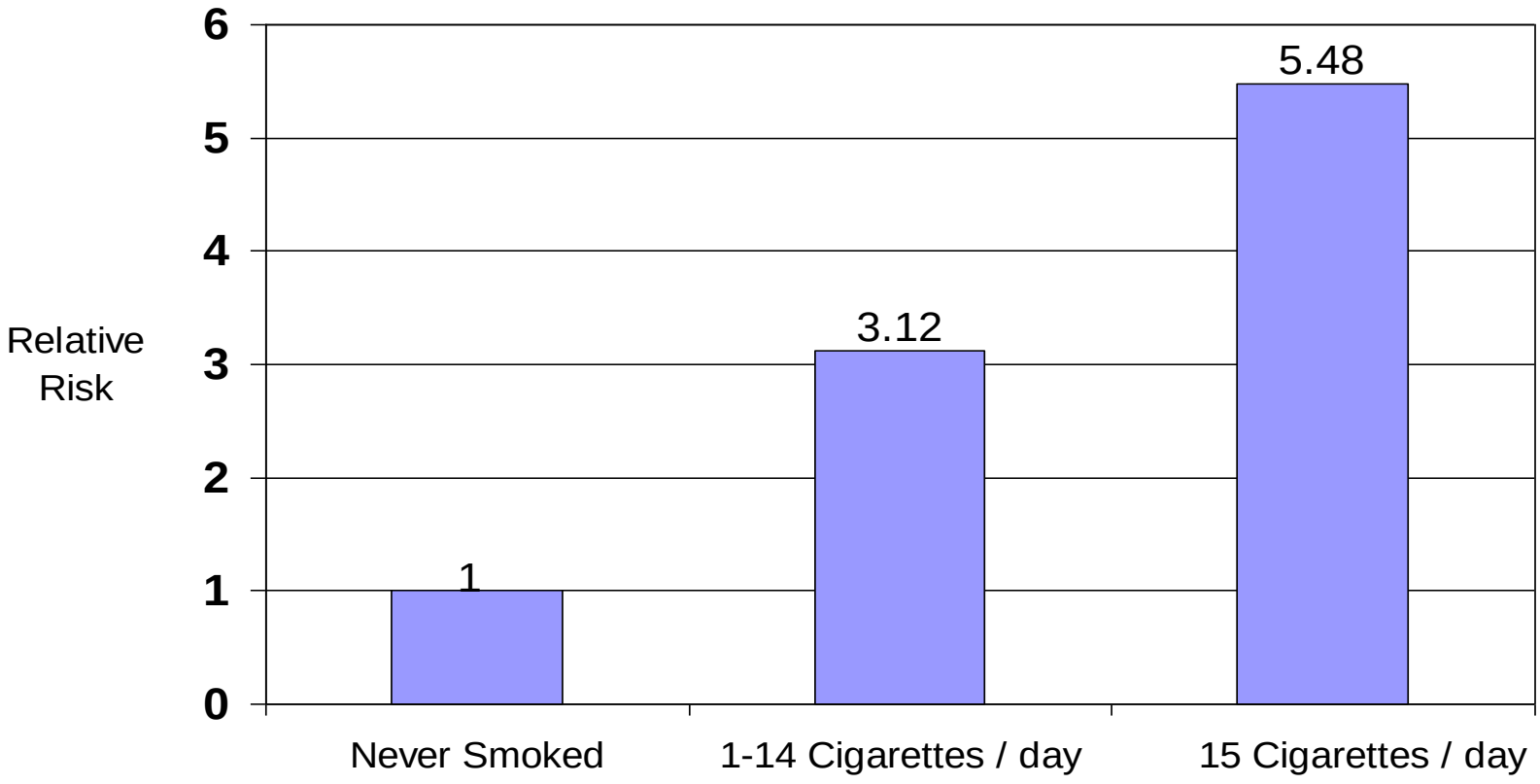
Cigarette Pack Years

Pack years = Packs smoked per day x years smoked

For example:

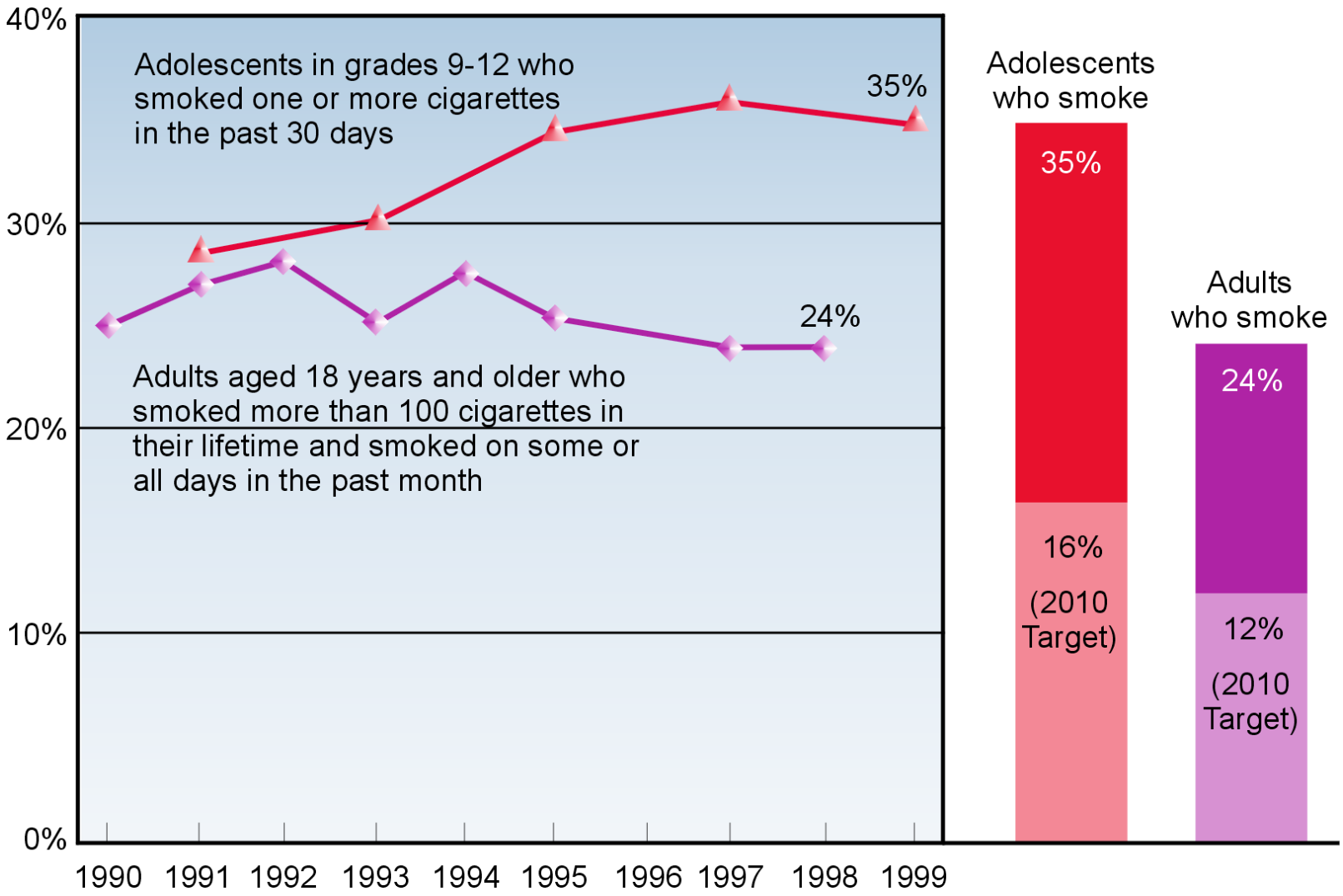
2 packs per day x 10 years = 20 pack years
1 pack per day x 20 years = 20 pack years
½ pack per day x 40 years = 20 pack years

Relative Risk of Coronary Events for Smokers Compared to Non-Smokers



Primary Prevention of Coronary Heart Disease in Women through Diet and Lifestyle
N Engl J Med. 2000 Jul 6;343(1):16-22. http://www.ncbi.nlm.nih.gov/pubmed/10882764

Tobacco Use – HP 2010 *Leading Health Indicator*



Cigarette smoking, United States, 1990–99

Changeable Risk Factors – Physical Inactivity

- Physical inactivity increases the risk of coronary heart disease by 1.5 to 2.4 times
- Optimal health benefits are gained when people expend 1500 to 2000 calories (walk 15 to 20 miles) per week
- Exercise for health does not have to be as strenuous as exercise for physical fitness

Changeable Risk Factors – Physical Inactivity

- Only 50% of young people in the United States (ages 12–21) regularly participate in vigorous physical activity
- One-fourth report no physical activity at all
- Physical inactivity is a primary contributor to the unprecedented explosion of obesity among children

Changeable Risk Factors – Physical Inactivity

- Physical activity is any physical movement that results in energy expenditure: walking, mowing the lawn, vacuuming
- "Every U.S. adult should accumulate 30 minutes or more of moderate intensity physical activity on most, preferably all, days of the week." (ACSM/CDC statement)
- According to the CDC, approximately 60% of the U.S. population is considered sedentary or marginally active

Changeable Risk Factors – Physical Inactivity

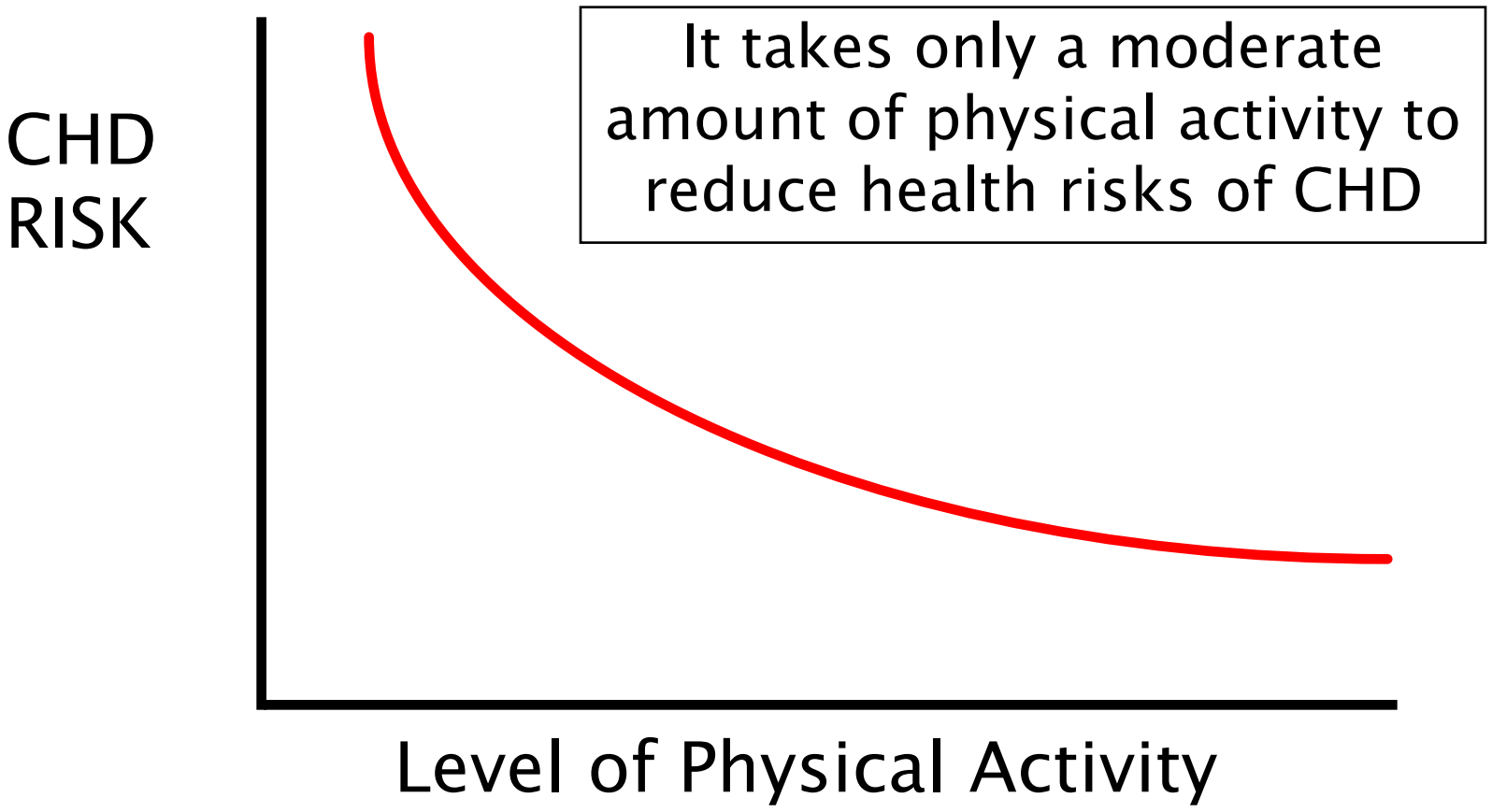
- People who were fit and obese had a lower risk for all-cause death than did people who were unfit and normal weight or lean
- It may be possible to reduce all-cause death rates among older adults, including those who are obese, by promoting regular physical activity, such as brisk walking for 30 minutes or more on most days of the week

JAMA®
The Journal of the American Medical Association

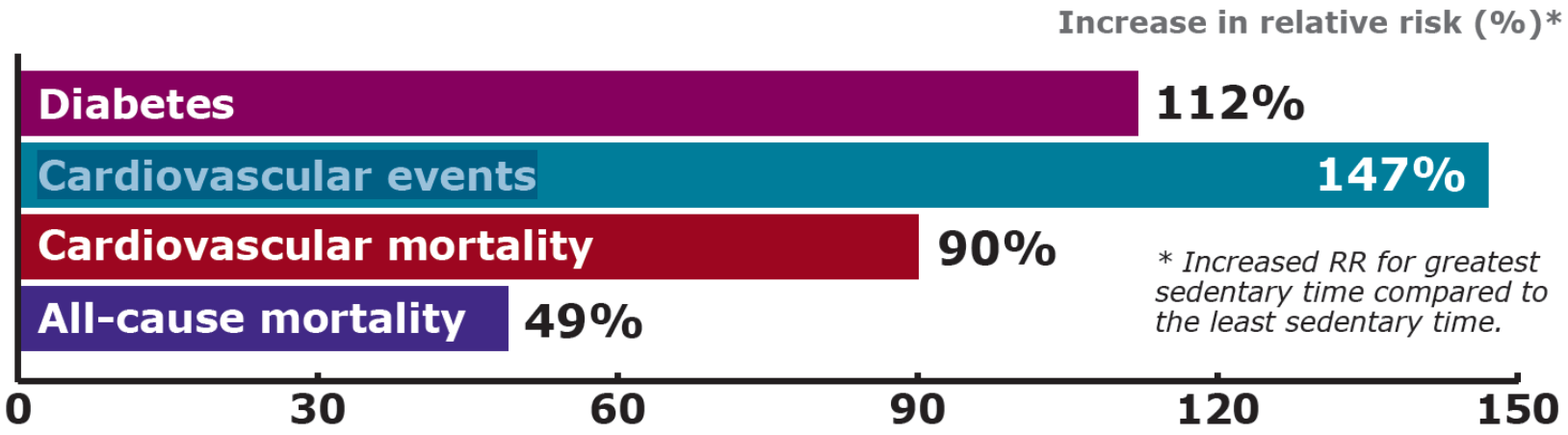
Cardiorespiratory Fitness and Adiposity as Mortality Predictors in Older Adults

JAMA. 2007 Dec 5;298(21):2507-16. http://www.ncbi.nlm.nih.gov/pubmed/18056904

Activity Reduces Coronary Heart Disease Risk



Changeable Risk Factors – Physical Inactivity



Meta-analysis of 18 studies with 794,577 participants

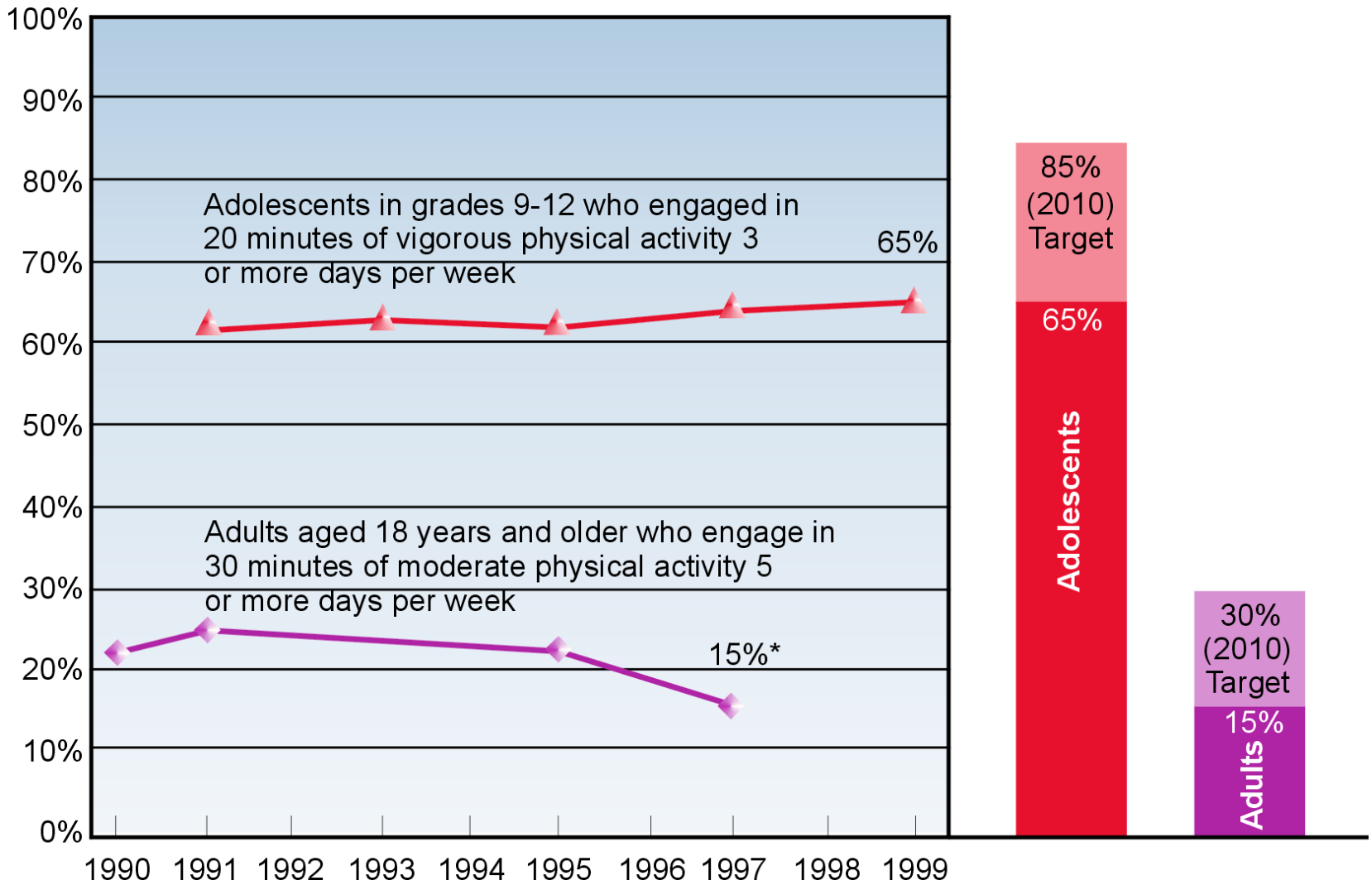
CONCLUSIONS: Sedentary time is associated with an increased risk of diabetes, cardiovascular disease and cardiovascular and all-cause mortality; the strength of the association is most consistent for diabetes.

The measurement of sedentary time varied (e.g. hours per day, hours per week, etc.) To overcome this discrepancy in reporting, we compared outcomes associated with the highest sedentary time with the lowest.

Sedentary time in adults and the association with diabetes, cardiovascular disease and death: systematic review and meta-analysis http://www.ncbi.nlm.nih.gov/pubmed/22890825

Physical activity
The following activities have similar benefits to health:
Washing and waxing a car for 45–60 minutes
Washing windows or floors for 45–60 minutes
Playing volleyball for 45 minutes
Wheeling self in wheelchair for 30–40 minutes
Bicycling 8 km in 30 minutes
Pushing a pushchair 2.5 km in 30 minutes
Walking 3 km in 30 minutes
Swimming laps for 20 minutes
Playing basketball for 15–20 minutes

Physical Activity – HP 2010 *Leading Health Indicator*



Participation in regular physical activity, United States, 1990–99

Changeable Risk Factors – Obesity

- Obesity contributes to about 300,000 deaths per year
- Fat that accumulates in the upper half of the body (central abdominal obesity) is significantly more likely to contribute to heart disease
- A 5% to 10% weight loss that is maintained can significantly reduce the risk of heart disease

by: irene joslin
WELL...LOOKIE THERE... HERE'S SOMETHING WE CAN BE PROUD OF
OBESITY
AMERICANS RANK FIRST IN THE WORLD

Need to consistently encourage healthy eating patterns

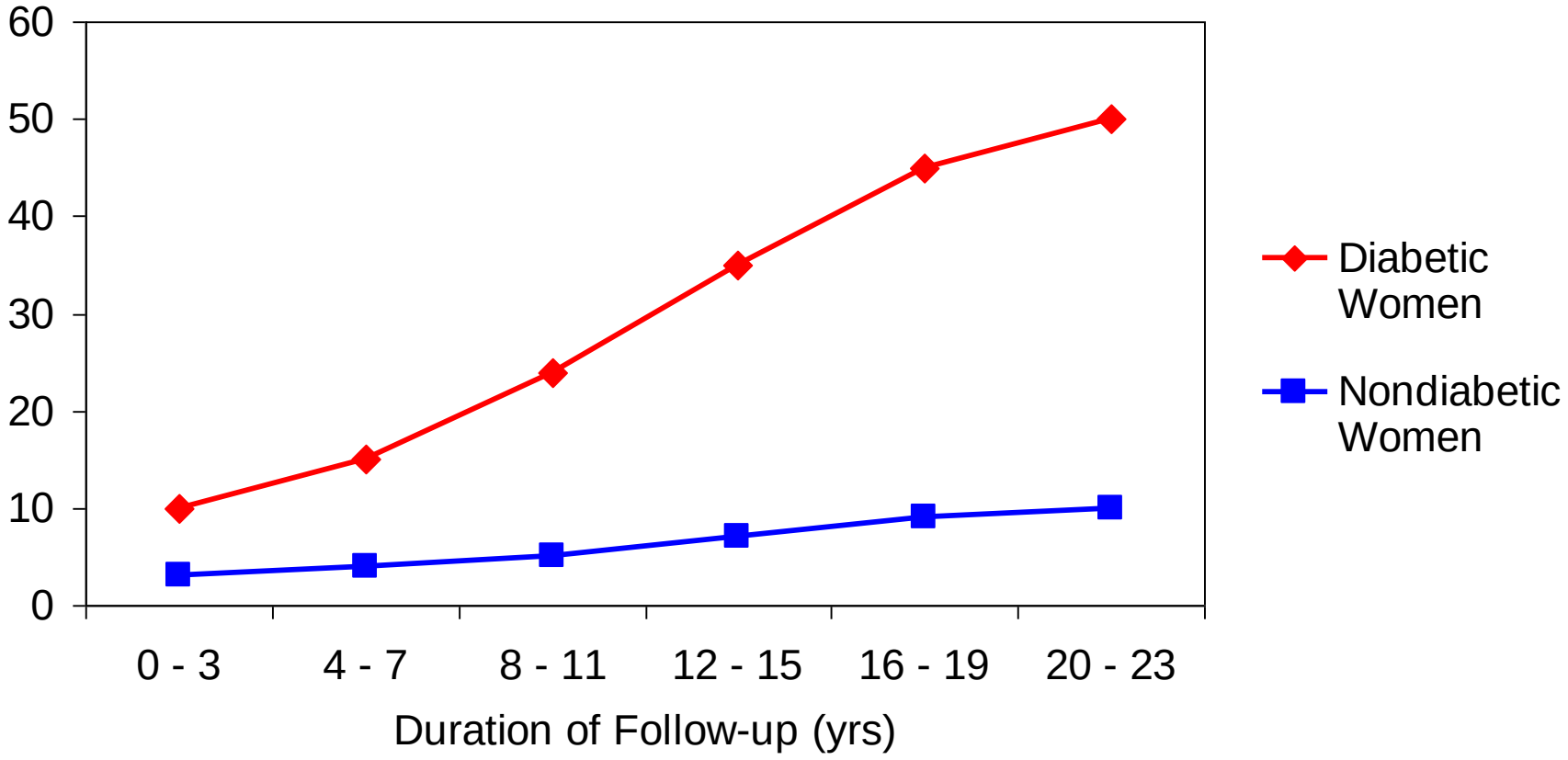
- Healthy food selections:
  - Fruits and vegetables
  - Whole grains, high fiber
  - Fish, especially oily fish, at least twice per week
  - No more than one drink of alcohol per day
  - Less than 2.3 grams of sodium per day (< 1.5 g/d may be beneficial, especially in African American patients)
- Saturated fats < 10% of calories, < 300 mg cholesterol
- Limit trans fatty acid intake (main dietary sources are baked goods and fried foods made with partially hydrogenated vegetable oil)

Circulation. 2007 Mar 20;115(11):1481-501. http://www.ncbi.nlm.nih.gov/pubmed/17309915

Changeable Risk Factors – Diabetes

- Diabetes is a metabolic disorder in which the body cannot properly use sugar (glucose) as fuel
- Type II (90% of all diabetes) occurs in older, overweight, sedentary adults
- Diabetes increases the risk of coronary artery disease 2 to 3 times in men and 3 to 7 times in women
- Vigorous exercise and maintaining normal body weight can reduce the incidence of Type II diabetes

Coronary Disease Mortality and Diabetes in Women



Am J Med. 1991 Feb 21;90(2A):56S-61S. http://www.ncbi.nlm.nih.gov/pubmed/1994719

Changeable Risk Factors – Stress

- Stress elevates heart rate, blood pressure, breathing rate, and blood sugar levels, activates the immune response, and causes other physiological changes
- Chronic (long-term) distress significantly strains the body

Managing Stress

- Learn to accept things you can't change. You don't have to solve all of life's problems.
- Count to 10 before answering or responding when you feel angry.
- Don't use smoking, drinking, overeating, drugs or caffeine to cope with stress. They make things worse.

Managing Stress

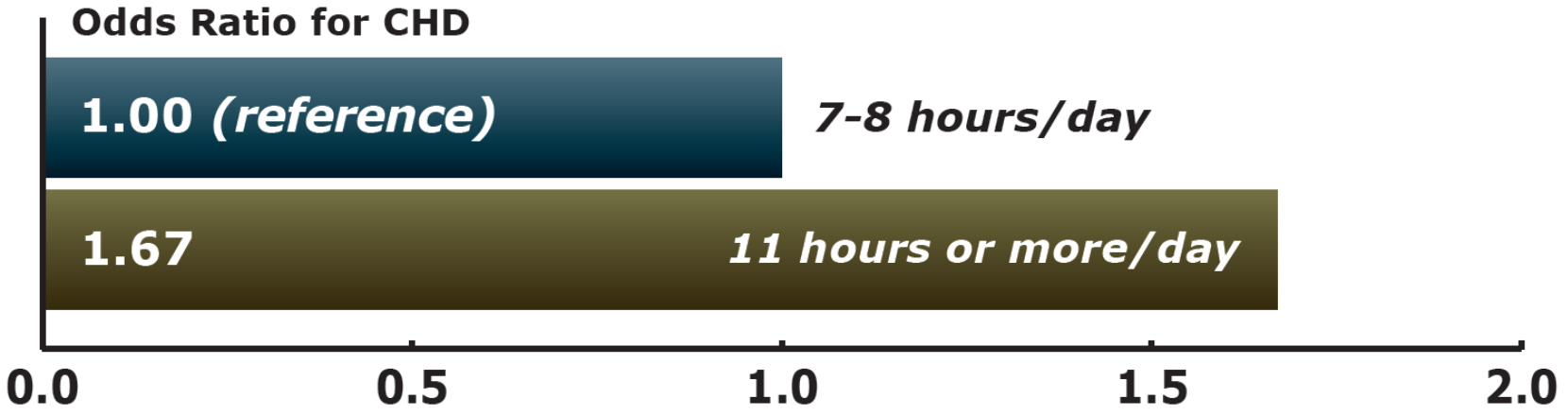
- Look for the good in situations, not the bad.
- Exercise regularly. Do something you enjoy. Check with your doctor to determine your activity level.
- Try to avoid things that may upset you. Cut back on your hours, or adjust your schedule to avoid rush-hour traffic.

Managing Stress

- Plan out productive solutions to problems. Set clear limits on how much you will do for friends or family members.
- Learn to say no. Don't promise too much. Give yourself enough time to get things done.
- Join a support group with which you identify.

Long Working Hours vs. CHD

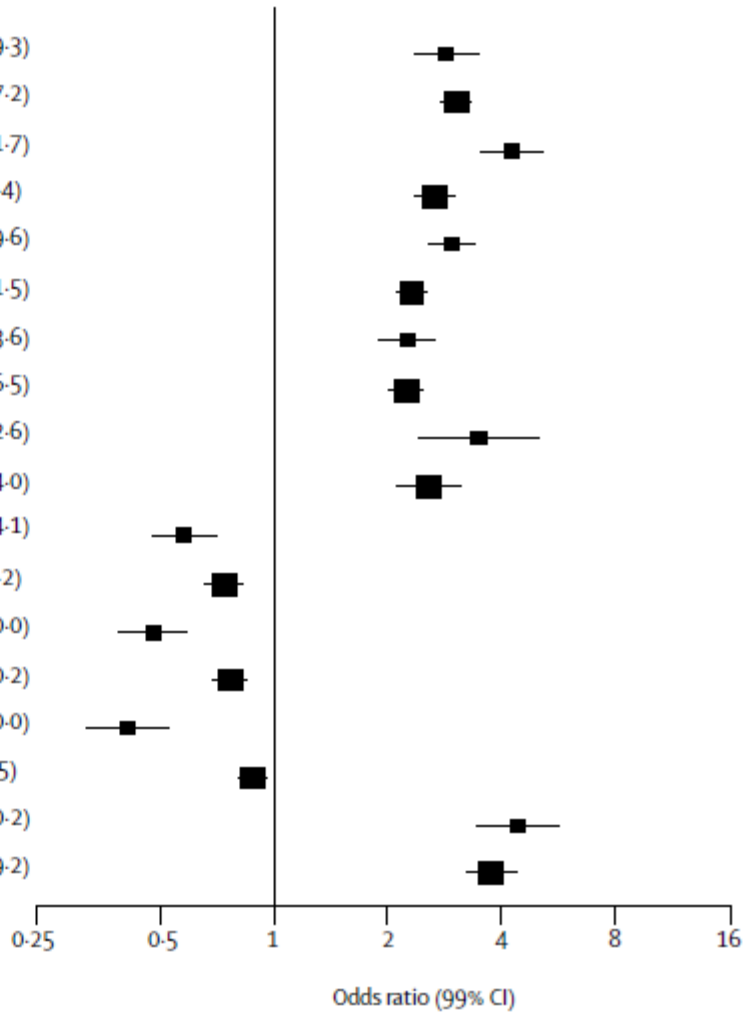
In a cohort of nearly 7100 men and women apparently free of coronary heart disease, long working hours predict coronary heart disease risk



Ann Intern Med. 2011 Apr 5;154(7):457-63 http://www.ncbi.nlm.nih.gov/pubmed/21464347

Summary of Risk Factors from the INTERHEART study

Risk factor	Sex	Control (%)	Case (%)	Odds ratio (99% CI)	PAR (99% CI)
Current smoking	F	9·3	20·1	2·86 (2·36–3·48)	15·8% (12·9–19·3)
	M	33·0	53·1	3·05 (2·78–3·33)	44·0% (40·9–47·2)
Diabetes	F	7·9	25·5	4·26 (3·51–5·18)	19·1% (16·8–21·7)
	M	7·4	16·2	2·67 (2·36–3·02)	10·1% (8·9–11·4)
Hypertension	F	28·3	53·0	2·95 (2·57–3·39)	35·8% (32·1–39·6)
	M	19·7	34·6	2·32 (2·12–2·53)	19·5% (17·7–21·5)
Abdominal obesity	F	33·3	45·6	2·26 (1·90–2·68)	35·9% (28·9–43·6)
	M	33·3	46·5	2·24 (2·03–2·47)	32·1% (28·0–36·5)
Psychosocial index	F	–	–	3·49 (2·41–5·04)	40·0% (28·6–52·6)
	M	–	–	2·58 (2·11–3·14)	25·3% (18·2–34·0)
Fruits/veg	F	50·3	39·4	0·58 (0·48–0·71)	17·8% (12·9–24·1)
	M	39·6	34·7	0·74 (0·66–0·83)	10·3% (6·9–15·2)
Exercise	F	16·5	9·3	0·48 (0·39–0·59)	37·3% (26·1–50·0)
	M	20·3	15·8	0·77 (0·69–0·85)	22·9% (16·9–30·2)
Alcohol	F	11·2	6·3	0·41 (0·32–0·53)	46·9% (34·3–60·0)
	M	29·1	29·6	0·88 (0·81–0·96)	10·5% (6·1–17·5)
ApoB/ApoA1 ratio	F	14·1	27·0	4·42 (3·43–5·70)	52·1% (44·0–60·2)
	M	21·9	35·5	3·76 (3·23–4·38)	53·8% (48·3–59·2)



N = 29,972 (52 countries)

Figure 4: Association of risk factors with acute myocardial infarction in men and women after adjustment for age, sex, and geographic region

Lancet. 2004 Sep 11-17;364(9438):937-52. http://www.ncbi.nlm.nih.gov/pubmed/15364185

Risk Factors are Cumulative

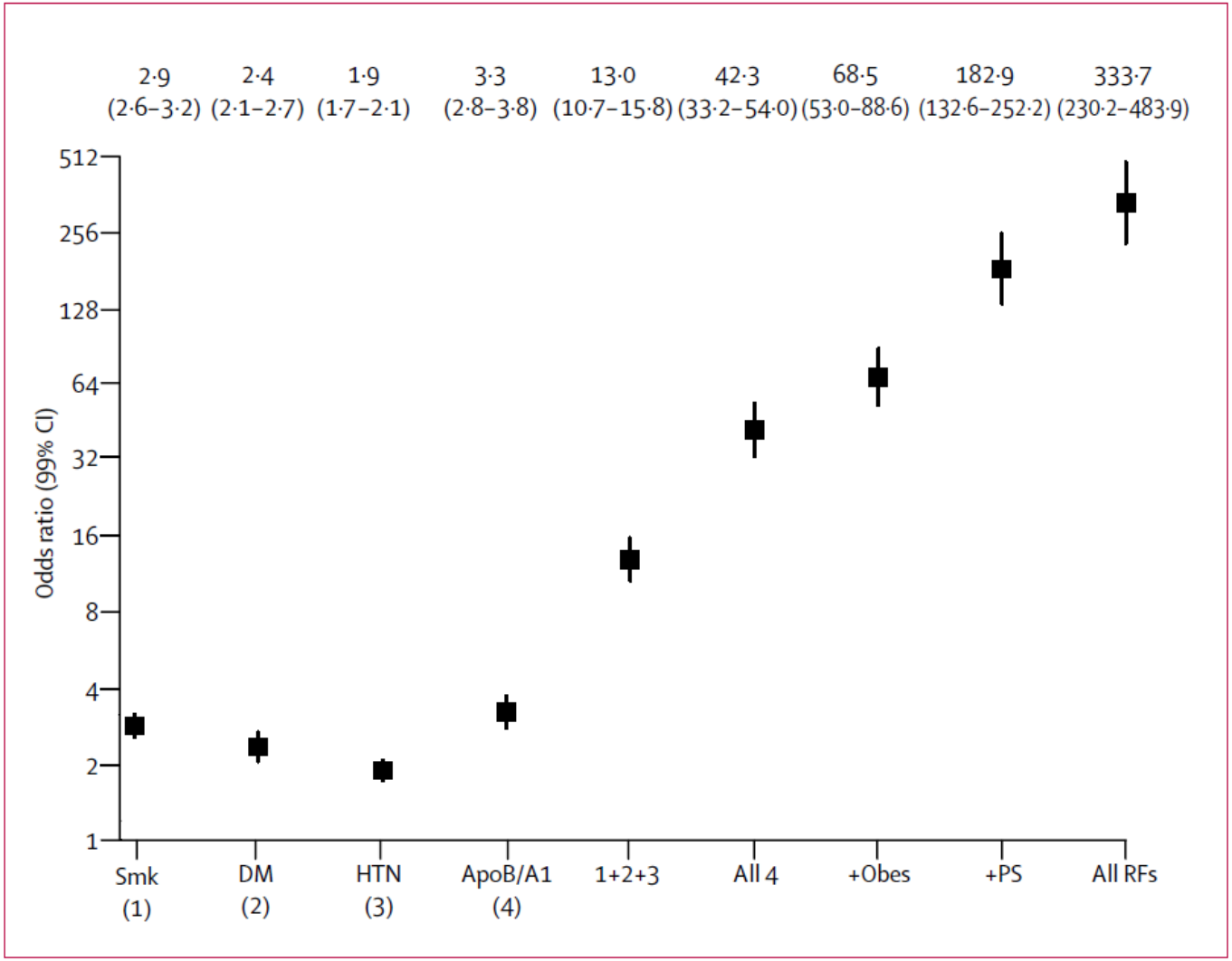
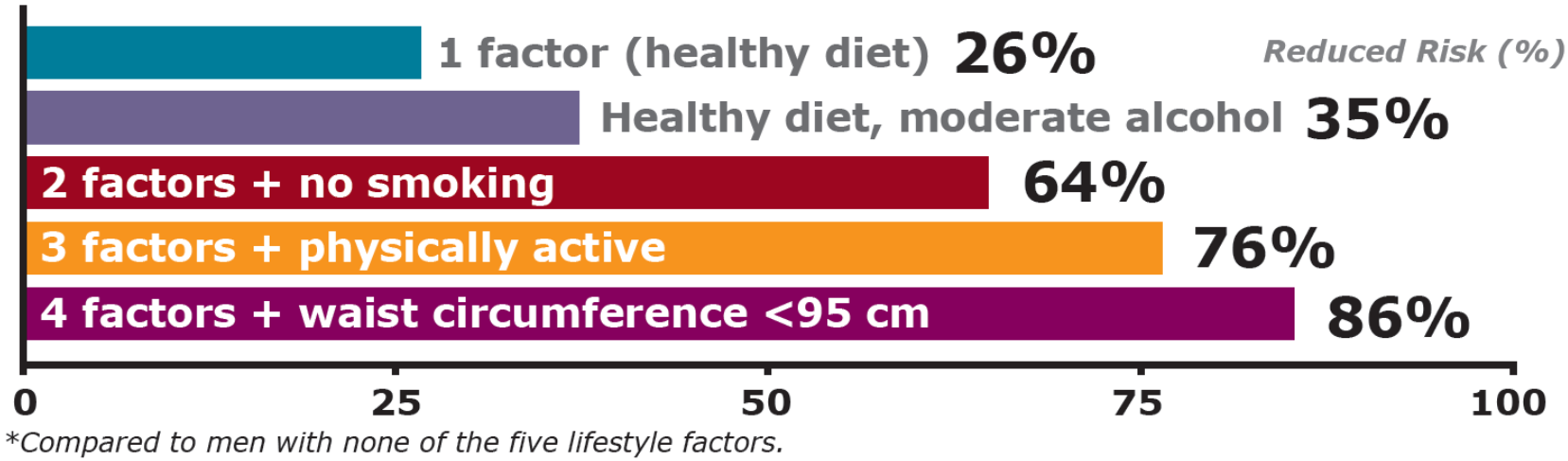


Figure 2: Risk of acute myocardial infarction associated with exposure to multiple risk factors

Lancet. 2004 Sep 11-17;364(9438):937-52. http://www.ncbi.nlm.nih.gov/pubmed/15364185

Lifestyle factors can dramatically reduce a man's risk of heart attack

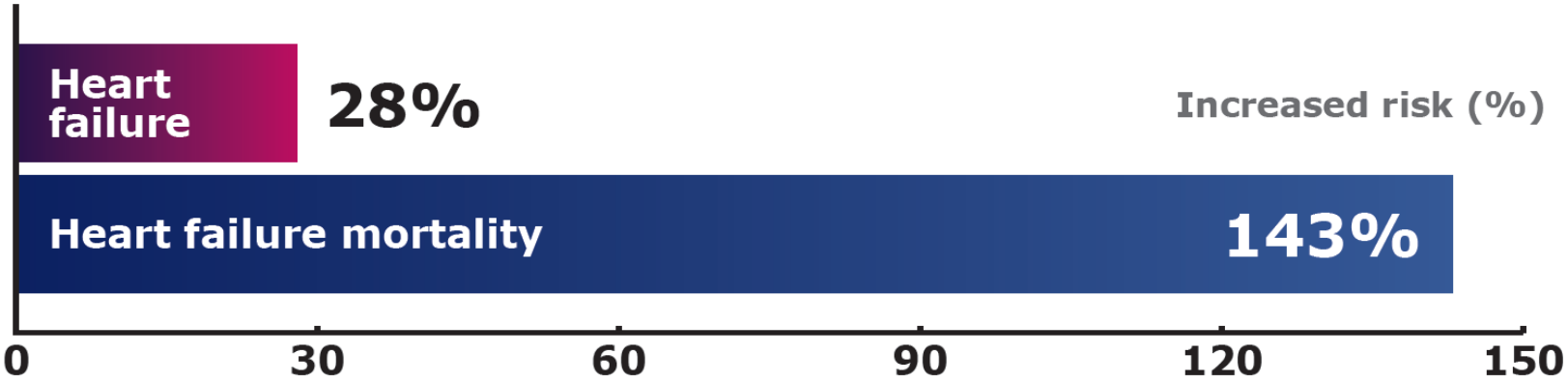


*Compared to men with none of the five lifestyle factors.

Low-risk diet and lifestyle habits in the primary prevention of myocardial infarction in men
J Am Coll Cardiol. 2014 Sep 30;64(13):1299-1306 http://www.ncbi.nlm.nih.gov/pubmed/25257629

Red Meat Consumption and Risk of Heart Failure

Men who consume more than 75 grams of **processed** red meat daily are at higher risk for heart failure than those who eat less than 25 grams per day



Note: 75 grams equals approximately 2.6 ounces; a hot dog typically weighs about 2-3 ounces.

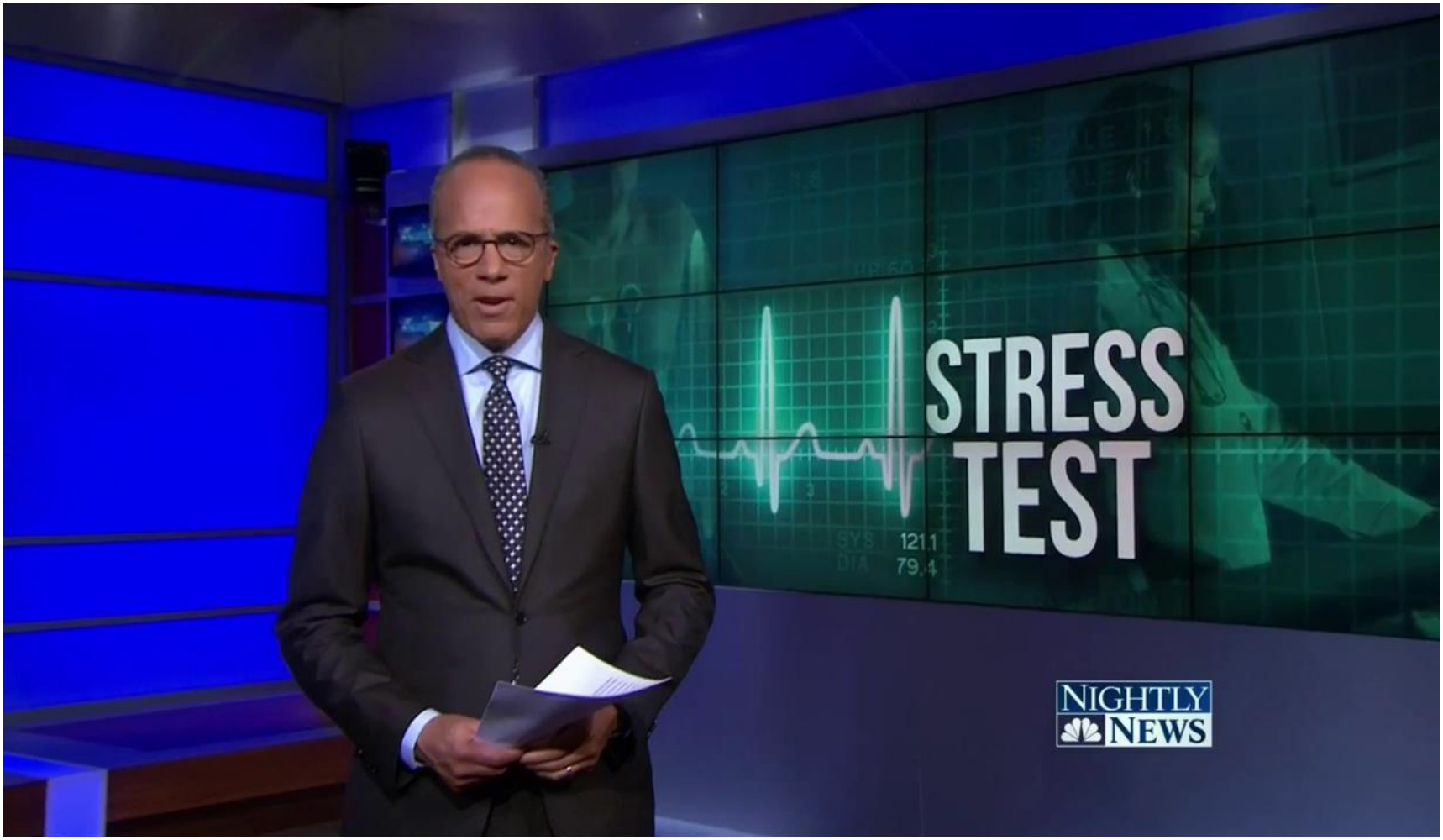
Findings from this prospective study of men with low to moderate red meat consumption indicate that processed red meat consumption, but not unprocessed red meat, is associated with an increased risk of Heart Failure

Circ Heart Fail July 2014 http://www.ncbi.nlm.nih.gov/pubmed/24926039

Other Risk Factors

- Too much iron
- C-reactive protein – marker for inflammation
- High homocysteine damages blood vessels (lowered with folic acid, B_6, and B_{12})
- Lipoprotein (a) promotes clot formation (lowered with niacin)
- Fibrinogen promotes clot formation

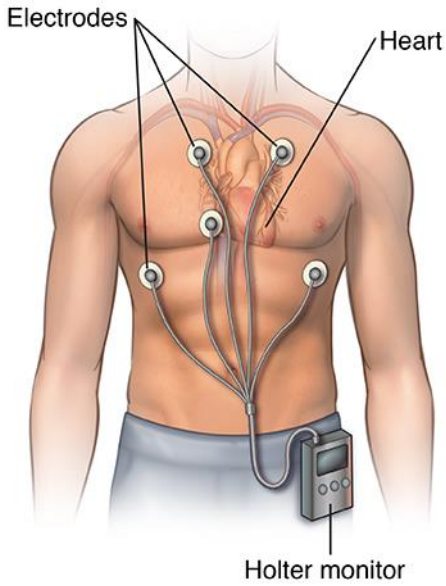
Problems with ECG Stress Testing



https://www.youtube.com/watch?v=SSgWOIFERPo

Heart rate variability (HRV)

- Heart rate is not perfectly regular but varies with the breathing cycle, speeding with inspiration and slowing down on exhalation. This respiratory sinus arrhythmia is a well-recognized marker of wellbeing, because it is most evident in the young, the fit, and the healthy.



- Impaired heart rate deceleration capacity is a powerful predictor of mortality after myocardial infarction and is more accurate than LVEF and the conventional measures of heart-rate variability.

http://www.ncbi.nlm.nih.gov/pubmed/16714188

Prevention of Heart Disease

Prevention includes:

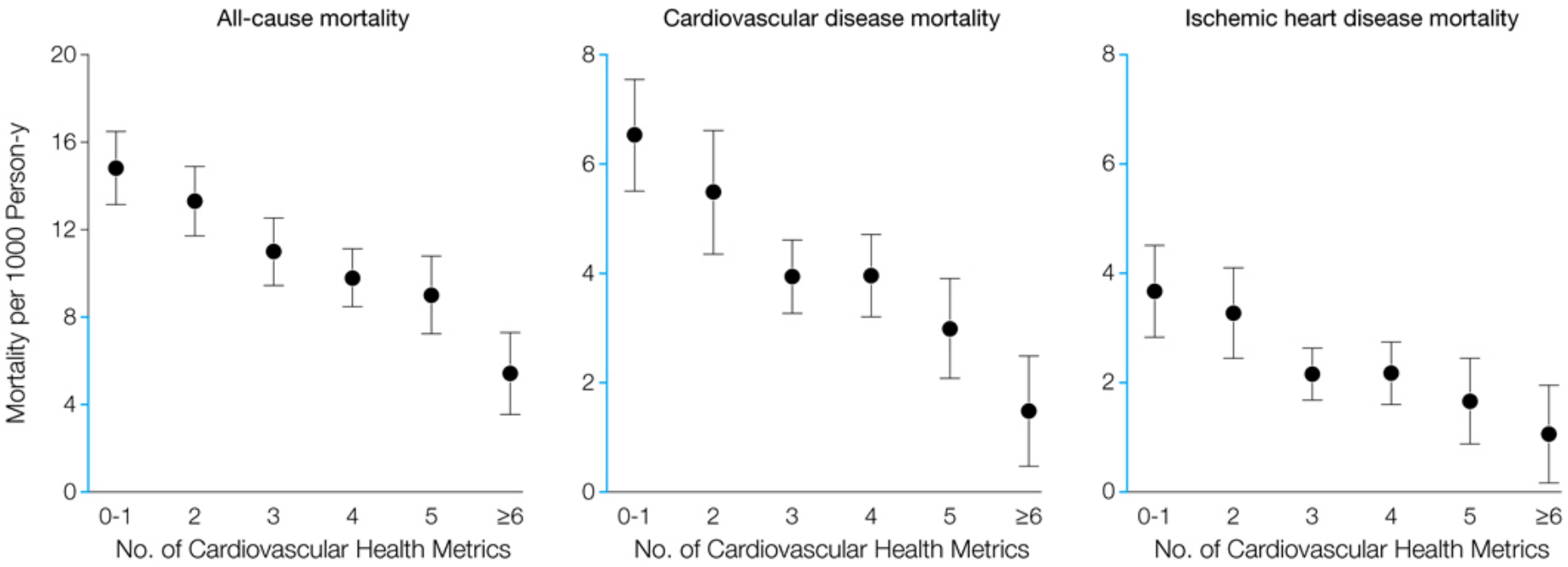
- Regular exercise
- Optimal body weight
- Sound nutritional practices
- Nonuse of tobacco and other drugs
- Nonuse or moderate use of alcohol
- Dealing constructively with stress
- Periodic medical examinations

Seven Ideal Cardiovascular Health Factors

- Not smoking
- Moderate exercise at least 5 times a week
- Untreated blood pressure under 120/80
- $HbA1_c$ under 5.7%
- Total cholesterol under 200 mg/dL
- BMI less than 25
- A diet high in produce, fish, and whole grains, and low in sodium and sugary beverages

Trends in Cardiovascular Health Metrics and Associations With All-Cause and CVD Mortality Among US Adults
JAMA. 2012 Mar 16;307(12):339. http://jama.ama-assn.org/content/early/2012/03/12/jama.2012.339.full

Trends in Cardiovascular Health Metrics



Mortality vs. 7 cardiovascular health metrics: not smoking; being physically active; having normal blood pressure, blood glucose and total cholesterol levels, and weight; and eating a healthy diet.

Trends in Cardiovascular Health Metrics and Associations With All-Cause and CVD Mortality Among US Adults
JAMA. 2012 Mar 16;307(12):339. http://jama.ama-assn.org/content/early/2012/03/12/jama.2012.339.full

Preventing and Reversing Heart Disease

- Dr. Dean Ornish's program to reverse atherosclerosis:
  - Vegetarian diet
  - Moderate aerobic exercise
  - Stress management
  - Smoking cessation
  - Meditation
- At the end of one year 82% showed **regression** of atherosclerosis

Can lifestyle changes reverse coronary heart disease? The Lifestyle Heart Trial. Lancet. 1990 Jul 21;336(8708):129-33. http://www.ncbi.nlm.nih.gov/pubmed/1973470

Reduction of Stenosis with Ornish Lifestyle Program

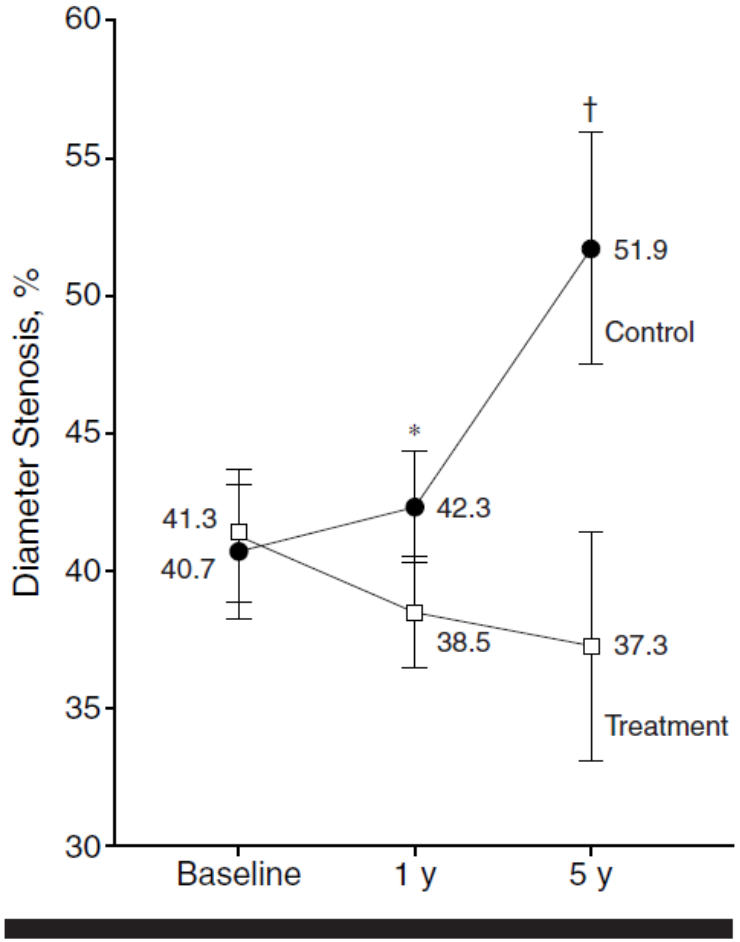


Figure 1.—Mean percentage diameter stenosis in treatment and control groups at baseline, 1 year, and 5 years.

Intensive Lifestyle Changes for Reversal of Coronary Heart Disease.
JAMA. 1998 Dec 16;280(23):2001-7. http://www.ncbi.nlm.nih.gov/pubmed/9863851

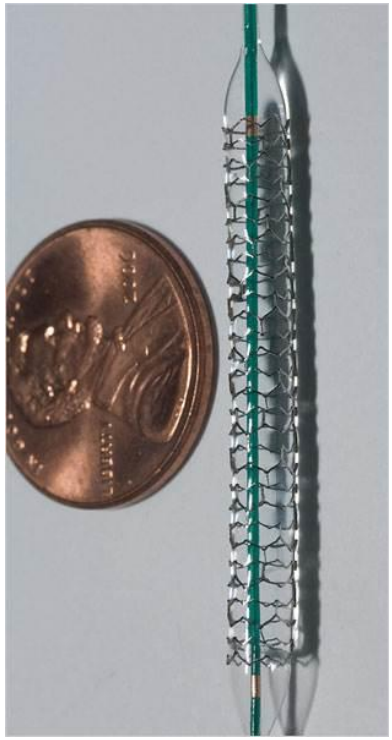
**“Heads, you get a quadruple bypass.
Tails, you take a baby aspirin.”**

You want to practice prevention to avoid the need for these medical procedures

- Low-dose aspirin therapy
- Balloon angioplasty
- Coronary stent
- Coronary artery bypass surgery
- Artificial valves
- Left ventricular assist devices
- Heart transplants

Are these medical procedures effective?

- In 2006, 1.3 million percutaneous coronary interventions were done at an average cost of $48,399 each, or more than $60 billion



- However, randomized controlled trials have found that angioplasties and stents do not significantly prolong life or even prevent heart attacks in patients who are stable (most patients who receive them)

Intensive lifestyle changes and health reform.
Lancet Oncol. 2009 Jul;10(7):638-9. http://www.ncbi.nlm.nih.gov/pubmed/19573793

Are these medical procedures effective?

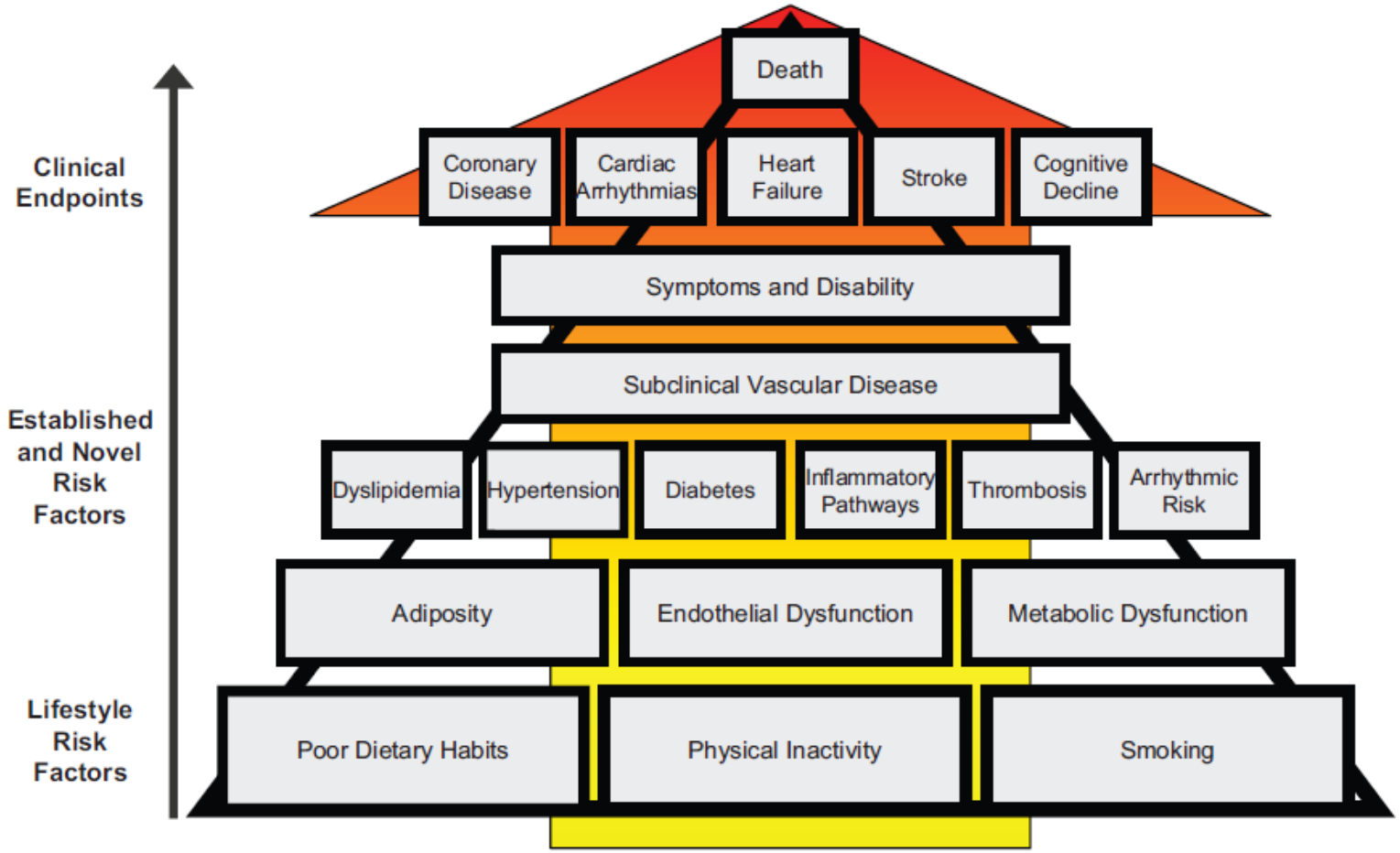
- Additionally, 448,000 coronary bypass operations were done at a cost of $99,743 each, or more than $44 billion
- Randomized controlled trials have found that coronary bypass surgery prolongs life in only a small proportion of patients – those with left main coronary artery disease or equivalent and left ventricular dysfunction (ejection fraction less than 30%)

Intensive lifestyle changes and health reform.
Lancet Oncol. 2009 Jul;10(7):638-9. http://www.ncbi.nlm.nih.gov/pubmed/19573793

Dr. Dean Ornish on CNN

https://www.youtube.com/watch?v=TrYDaukCnk8&hd=1

Prevention is the key to forestalling the need for crisis care intervention



Beyond Established and Novel Risk Factors: Lifestyle Risk Factors for Cardiovascular Disease. Circulation. 2008 Jun 10;117(23):3031-8. http://www.ncbi.nlm.nih.gov/pubmed/18541753